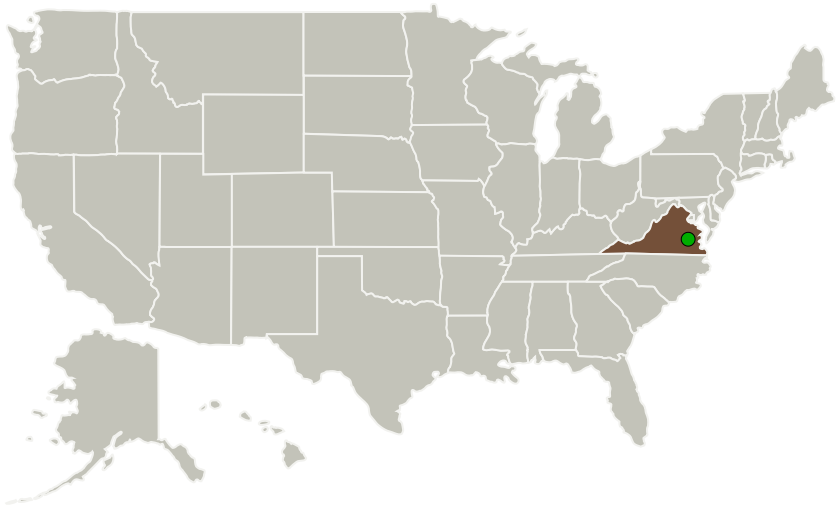
Innovative, Lightweight Thoraeus RubberTM for MMOD and Space Radiation Shielding, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

NanoSonic offers an innovative manufacturing process to yield ultra-lightweight radiation shielding nanocomposites by exploiting the concept of the Thoraeus filter on the nanoscale. Our elegant, layer-by-layer deposition process allows for unique layering with molecular level precision to covalently bind advanced polymers with alternating layers of high and low z nanoparticles. While radiation shielding cannot be achieved without some combination of mass density and appropriate choice of materials, NanoSonic's Thoraeus Rubber™ are nanostructured layers engineered in a manner to maximize shielding with minimum bulk within a hydrogenous network to address neutron emissions in addition to RF, gamma, X-ray and high energy particles. Radiation shielding shall be evaluated at Colorado State University and the Brookhaven Radiation Effects Facility to verify protection for humans and exploration vehicles envisioned for Low Earth Orbit (LEO) and long-duration missions beyond LEO. Thermal, mechanical, and RF characterization would be carried out at NanoSonic. Micrometeoroids and Orbital Debris (MMOD) resistance and outgassing would be carried out by our space prime partner. Candidate materials shall be delivered in support of demonstration experiments for Materials International Space Station Experiment (MISSE). TRL 8-9 would be achieved upon demonstration of human and electronics protection from long-duration galactic cosmic radiation (GCR) and solar energetic particles (SEP).

Primary U.S. Work Locations and Key Partners



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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Nanosonic, Inc.	Lead Organization	Industry	Pembroke, Virginia
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations
Virginia

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138661)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Nanosonic, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

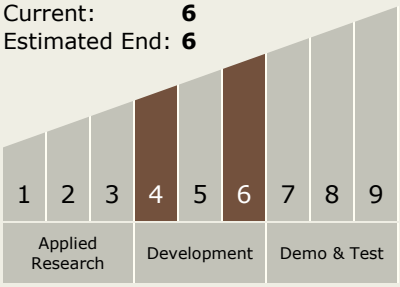
Carlos Torrez

Principal Investigator:

J. Lalli

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.5 Radiation
    - TX06.5.3 Protection Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System